

Assessment of Gingival Biotype and Keratinized Gingival Width of Maxillary Anterior Region in Individuals with Different Types of Malocclusion

Laila Azher Jawa¹, Zehra Azher Jawa² and Zubair Hassan Awaisi¹

Gingival Thickness and Width of Keratinized Gingiva and Amount of Crowding in Adult

ABSTRACT

Objective: To explore the association of gingival thickness and width of keratinized gingiva and amount of crowding in adult population.

Study Design: Cross-sectional study

Place and Duration of Study: This study was conducted at the department of Orthodontics at Nishtar Institute of Dentistry, Multan from May 2021 to February 2022.

Materials and Methods: For the abovementioned purpose we enrolled 80 subjects with good gingival condition. Then each individual was examined clinically and the findings were recorded. We divided the selected participants into three main groups according to the Angle classification of crowding in Class I, II, and III, and then each group in relation to the expanse of irregularity in their dentition was divided into mild, moderate, and severe. A clinical examination was performed in all subjects, WKG was measured in vertical direction as the distance between mucogingival junction and free gingival margin, and on the other hand either gingival biotype was thick or thin was assessed by trans-gingival probing technique.

Results: Gender distribution of our study cases male 22 (27.5%) and 58 (72.5%) were female with age ranged between 12-25 years. Thin gingival biotype was observed in upper canines. For tooth numbers 13 and 23 the width of keratinized gingiva was also narrower in the severe crowding group. However, there was no significant relationship ($p>0.05$).

Conclusion: This cross-sectional study results failed to demonstrate significant correlation between keratinized gingival width and the gingival thickness in the anterior region of upper arch and malocclusion.

Key Words: Gingival biotype, width of keratinized gingiva, trans-gingival probing, thin tissue biotype, thick tissue biotype.

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INTRODUCTION

In clinical practice of orthodontics, a great emphasis on proper diagnosis of the periodontal biotype is placed as this is an important factor with respect to the decision-making and treatment planning.

If the teeth are to be protected and positioned correctly, the gingival complex should be in good condition. Generally healthy periodontal tissues are categorized into thin, scalloped or thick flat according to Ochsenbein & Ross in 1969¹.

¹. Department of Orthodontics / Oral & Maxillofacial Surgery², Nishtar Institute of Dentistry, Multan.

Correspondence: Dr. Laila Azher Jawa, Postgraduate Resident of Orthodontics Dept., Nishtar Institute of Dentistry, Multan.
Contact No: 0332-0699556
Email: laila.azher.jawa@gmail.com

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The term “periodontal biotype” was described into different types by Seibert and Lindhe². Gingival biotype is simply the buccolingual thickness of the gingiva. It is determined by the shape and size of the dental root and contour of the alveolar bone³. According to Claffey and Shanley⁴ the thin tissue biotype is when GT is less than 1.5 mm, and the thick tissue biotype was referred to as having a tissue thickness more than 1.5 mm. Different individual factors contribute to biotype variances including genes, morphology and position of teeth, age, gender and type of growth⁵. A healthy periodontal tissue is an essential factor that should be considered before the orthodontic treatment as other factors that may have a critical role in the incidence of failures.⁶ During orthodontic tooth movement, sometimes, there are changes in the mucogingival complex and this is an important tool that should be evaluated before and during the planning process, as also an evaluation of the thickness of the gingival tissue, in order to avoid periodontal complications, as gingival recession or bone and root resorption.⁷ It was shown that a gingival thickness more than 0.5 mm reduce the risk of gingival

recession, possibly due to the reason that different periodontal biotypes respond in a different way to inflammation and trauma induced by inappropriate insult during treatment⁸.

Therefore, the aim of the present study was to inspect the association between gingival thickness and width of keratinized gingiva with the Angle's classification of malocclusion groups.

MATERIALS AND METHODS

In this cross-sectional study total 80 (22 male and 58 female) subjects were enrolled between age 12-25 years, all the participants were those who visited the Orthodontic department at Nishtar Institute of Dentistry. The mean age in males was 14.2 ± 2.5 and in females was 16 ± 2.1 . Informed consent was obtained from all patients.

The study population comprises of periodontally healthy subjects, who have no history of orthodontic treatment or other surgical treatment, have completed permanent dentition and have no missing anterior maxillary teeth, and with no crowns or extensive restorations, with no periodontal disease and those were also excluded from the study who were taking certain medications with known effects on the gingiva. The participants of the study were separated into three groups on the basis of Angle's classification of malocclusion that is Angle Class I, Angle Class II, and Angle Class III. Further divided into mild (0-3 mm), moderate (4-6 mm), and severe (>6 mm)¹⁰ groups according to the measure of the irregularity present. In this study we selected anterior region of maxilla to be evaluated.

In this study we calculated width of keratinized tissue of anterior teeth in upper arch by measuring the distance between the two points, one point was marked at the end of free gingival margin and the second point was positioned at the mucogingival junction³. Periodontal probe was used to attain the width. For trans-gingival probing, Xylocaine spray if necessary was applied before probing. Gingival thickness in the study region was achieved by penetrating the tissue with an endodontic file with stopper. After removal, the file was measured using a digital caliper. All the measurements were obtained by the single examiner.

We used chi-square test to assess any correlation present among gingival biotype and Angle classification, crowding, age and gender. P-value less than 0.05 were considered significant for all tests.

RESULTS

In this specific study there was no significant difference found between the different groups. Distribution and the percentage of patients is shown in table 1 and distribution of gingival biotype is shown in table 2.

Table No.1: Distribution and percentage of patients

		Amount of crowding		
		Mild	Moderate	Severe
Angle Class I	Count	12	8	23
	% within Angle classification	27.9%	18.6%	53%
	% within crowding amount	50%	53%	56%
	% of total	15%	10%	28.7%
Angle Class II	Count	10	5	15
	% within Angle classification	33%	16%	50%
	% within crowding amount	41%	33%	36.5%
	% of total			
Angle Class III	Count	2	2	3
	% within Angle classification	4.6%	4.6%	42.8%
	% within crowding amount	8.3%	8.3%	7.3%
	% of total	2.5%	2.5%	3.75%

(P>0.05)

Table No.2: Distribution of gingival biotype according to Angle classification, amount of crowding, and gender

		Gingival biotype		P
		Thin (n=%)	Thick (n=%)	
Angle Classification of malocclusion	class I	20 25%	23 28%	0.82
	class II	6 7.5%	24 30%	0.87
	class III	2 2.5%	5 6.25%	0.85
Amount of crowding	Mild	6 7.5%	10 12.5%	0.76
	Moderate	19 24.37%	23 28.75%	0.76
	Severe	10 12.5%	19 23.75%	0.758
Females		23 28.75%	35 43.75%	0.11
Males		5 6.25%	17 21.25%	0.10
Total		28 35%	52 65%	

(P>0.05)

The thin gingival biotype in all groups was 35%. Although thin biotype was more common in severe crowding and in females than males but the difference was not significant enough to be considered. When the maxillary anterior teeth were evaluated, mostly tooth numbers 13 and 23 with thin gingival thickness were observed. Gingival thickness of upper lateral incisors with thick biotype was higher especially in the severe crowding group than other crowding groups. Assessment of keratinized gingival width in different amount of crowding according to angle classification shows that in severe crowding it is narrower than mild and moderate amount of crowding. In tooth number 13 and 23 it is narrower when they are buccally placed in severe crowding group. WKG is determined to be wider in class II and mild crowding. The Angle classification and width of keratinized gingiva did not appear to have

a statistically significant relationship in the following study.

DISCUSSION

In orthodontic treatment, the characteristics and thickness of the gingival tissue plays an important role especially, for aesthetic reasons, in the maxillary anterior area,⁹ a decrease gingival tissue thickness during orthodontic treatment can be a cause of gingival recession or other risk factors such as dehiscence or fenestrations, while thick flat biotype is linked with deep periodontal pockets¹⁰. Therefore, to identify gingival biotype more accurately in order to avoid any kind of complications is momentous.

Careful evaluation of the periodontal tissues is a key to avoid any problem associated with thin gingival biotype especially in cases where protrusion or proclination of the incisors is required. The author of several studies in the literature presented that It to identify the amount of protrusion, biological factors and width of keratinized gingiva in the relevant region is important¹¹. According to Yared et al⁷ gingival biotype is important than other parameters, and it should be evaluated and considered in treatment planning.

Several studies have advocated that the gingival biotype is associated with gingival thickness and described different methods for measuring gingival thickness. Invasive and non-invasive methods have been employed to assess periodontal biotype, such as trans- gingival probing, probe transparency and CBCT^{3,12}. The literature review showed that techniques such as visual assessment and ultrasonic devices have also been used in determining gingival thickness^{8,13}. Among these techniques invasive methods are injection needle or probe, histologic analysis or radiographs, and non-invasive methods includes visual examination, ultrasonic devices, gingival probing and CBCT⁹. The visual assessment technique is not reliable³. The cone beam computed tomography is more accurate but it has potential side effects of radiation¹⁴.

In our study the prevalence of thin gingiva is more common in females (28.7%), the results were similar to the other studies like study done by Zawawi et al¹⁵, in their study they also found that thin biotype is more frequent in females.

In our study this difference between the gender is not statistically significant.

The keratinized gingival width is another factor which was thought to be associated with severity of crowding. According to the study by Yared et al⁹ WKG <2mm would be insufficient to maintain periodontal health gingival width <2mm would be In this study we noted that keratinized gingival width of the maxillary anterior teeth was between the range of 2 to 7 mm depending upon the different amount of crowding and angle classification. In our study we found that WKG of tooth numbers 13 and 23 were smaller in the severe crowding

group than in the mild and moderate crowding groups, but the overall results were not significant enough to found any difference among the groups. The results of our study were similar to the study conducted by Alkan et al¹⁶. Similar to the results of Younes et al¹⁷, we found that while evaluating the gingival thickness of the maxillary anterior teeth gingival biotype of the teeth number 13 and 23 was thin than central and lateral incisors.

In our present study there was no significant correlation found among gingival biotype and amount of crowding in maxillary anterior teeth like studies by Zawazi and Al-Zahrani¹⁸, they also concluded that association between gingival biotype and amount of crowding no significant correlation was observed similar to the studies done by Alkan et al¹⁹.

CONCLUSION

It was observed that Results are not statistically significant the location of the teeth in the dental arch affect gingival thickness and keratinized gingival width like buccally placed canines have thin gingival biotype and palatally placed lateral incisors have thick gingiva. The WKG was lower in the canines placed buccally.

Author's Contribution:

Concept & Design of Study:	Laila Azher Jawa
Drafting:	Zehra Azher Jawa, Zubair Hassan Awaisi
Data Analysis:	Zubair Hassan Awaisi , Zehra Azher Jawa
Revisiting Critically:	Laila Azher Jawa, Zehra Azher Jawa
Final Approval of version:	Laila Azher Jawa

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